



An Energy Efficiency Workshop & Exposition
Kansas City, Missouri

***Puget Sound Naval Shipyard (PSNS):
Energy Assessment Results***

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PSNS Assessments Were A Collaborative Effort

- Responsive to Executive Order 13123 For Federal Industrial Facilities
- Collaborative Effort Between:
 - DOE Federal Energy Mgt. Program
 - DOE Office of Industrial Technologies
- Assessments Used OIT BestPractices Resources



Puget Sound Naval Shipyard Assessment Covered Four Areas

- Steam System
- Compressed Air System
- Power System
- Welding Operations



Puget Sound Naval Shipyard Energy Assessment Team Members

- **STEAM**
 - Dr. Greg Harrell, Virginia Tech
- **COMPRESSED AIR**
 - Frank Moskowitz
- **POWER SYSTEM**
 - Jeff Cleveland, Gene Porter (Oak Ridge Y-12 Engineering)
- **WELDING OPERATIONS**
 - Stan David (ORNL)
 - George Cook (Vanderbilt Univ.)
 - Dave Olson (Colorado School of Mines)
 - Frank Armao (Lincoln Electric)



Puget Sound Naval Shipyard Description

- Part Of Bremerton Naval Complex
- Repairs - All Types Of Naval Ships
- Nine Peers, 6 Dry Docks, 382 Buildings With 6.1 Million Sq. Ft.
- Annual Utilities - \$9.3 Million For Electricity And Steam



Steam Assessment Findings

- Steam system well managed, operated, and maintained
- Boilers well operated – efficiency about 83%
- Personnel manage boiler fuels based on fuel price



Steam Opportunities

- Flue gas oxygen control project underway – potential savings of \$30,000 per year
- Isolating steam headers during extended periods of reduced steam demand
- Examine steam loss associated with forge sites



Compressed Air System Assessment

- PSNS air system has 7 compressors at three locations
- 11,250 total connected horsepower
- Normal operation uses 4 compressors with 4,000 HP
- Annual cost associated with compressed air system is over \$1,000,000



Compressed Air Findings

- System pressure (120 psi) higher than needed
- No central control system for the distributed supply
- Plans call for new high-quality dryers but only 5% of air needs require this level of drying
- Pneumatics used for air movers



Compressed Air Recommendations

- Lower pressure
- Install sequencer
- Institute leak prevention program
- Install point of use dryers
- Use blowers where appropriate

Potential Savings \$500,000 per year



Scope of PSNS Power Study

- Identify Potential Energy Savings - Efficient Operation Of PSNS Electrical Distribution System:
 - Existing power contract rate structure
 - Magnitude of system losses
 - Power factor and use of power factor correction capacitors
 - Power quality
 - Temporary power systems
 - Submetering
 - Application of energy-efficient motors
- Highlight Important Design Considerations For Planned Future Enhancements



Power Assessment Results

- TEMPORARY POWER SYSTEMS:
 - Not a fruitful area; increasing conductor size results in paybacks of over 65 years
 - Locate 480 substations for new installations as close to end-use loads as possible
 - Design service galleries and tie-in points to minimize cable lengths



Power Assessment Results (cont.)

- **SYSTEM SUB-METERING:**
 - Four points of delivery for revenue metering
 - Three RPM meters installed on 12 kV system
 - Additional metering for 480 V distribution system serving waterfront area needed to:
 - Allocate energy costs
 - Monitor power quality



Power Assessment Results (cont.)

- **CONSIDER ENERGY-EFFICIENT MOTORS FOR:**
 - New facilities or system upgrades
 - When purchasing spare motors
 - When motors are significantly undersized or oversized for the load supplied
 - When older motors are reaching end-of-life status
 - Instead of rewinding failed motors



Power Assessment Results (cont.)

- **PAYBACK:**
 - To replace existing 50 HP standard efficiency motor with new premium efficiency motor = approx. 9 years
 - For incremental difference between a new premium efficiency motor vs. a new standard efficiency motor = approx. 2 years



Power Assessment Conclusions

- Distribution system infrastructure appears to be well-managed and efficiently run
- Use of power factor correction capacitors positions PSNS well for potential power contract changes in the future
- Low cost of electrical power make it difficult to economically justify energy saving projects using simple payback
- Poor power quality can have a detrimental effect on operational efficiency and reliability; biggest offenders are located at the 480 V level and lower



PSNS Welding Operation Assessment Scheduled

- Preliminary assessment at plant completed
- Team of experts assembled
- Coordination meeting held via conference call
- Assessment scheduled at PSNS in May



OIT BestPractices Energy Assessment Support

- Focused Assessments
- Software Tools
- Best Practices Training



Focused Assessments By Energy Management Experts

- Available To Support Showcases, Corporate-Wide Training
- Types Of Assessments Supported:
 - Motors and drives
 - Pump systems
 - Compressed air systems
 - Steam systems
 - Process heat systems



BestPractice Software Tools

- Pump System Assessment Tool (PSAT)
- Steam System Scoping Tool
- Process Heating System Assessment Tool
- AirMaster+
- Motor Master+ 3.0
- ASD Master
- 3E-Plus for Windows

www.oit.doe.gov/bestpractices



BestPractices Training

- Company-Wide, Regional Basis:
 - Steam system improvement (1 day)
 - Adjustable speed drive application (1 day)
 - Pump system assessment (1 day)
 - Fundamentals, compressed air systems (1 day)
 - Adv. Mgt., compressed air systems (1 day)



BestPractices Training (cont.)

- Available Soon:
 - Fan system performance assessment (1 day)
 - Optimizing process heating systems (1 day)
 - Motor system management (1 day)
- Soon Through Allied Partners:
 - Insulation appraisal (2 days)
 - AirMaster training (2 days)